IXYS

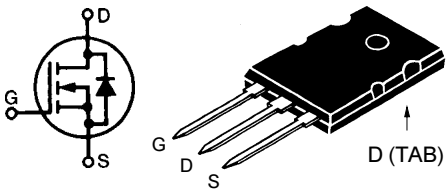
Preliminary Data Sheet

HiPerFET™ Power MOSFET

Single MOSFET Die

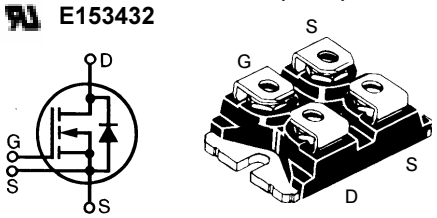
	V_{DSS}	I_{D25}	$R_{DS(on)}$	t_{rr}
IXFN 55N50	500V	55A	85mΩ	250ns
IXFN 50N50	500V	50A	100mΩ	250ns
IXFK 55N50	500V	55A	85mΩ	250ns
IXFK 50N50	500V	50A	100mΩ	250ns

TO-264 AA (IXFK)



miniBLOC, SOT-227 B (IXFN)

E153432



G = Gate D = Drain
S = Source TAB = Drain
Either Source terminal at miniBLOC can be used as Main or Kelvin Source

Symbol	Test Conditions	Maximum Ratings IXFK 55N50	IXFK 50N50	IXFN 55N50	IXFN 50N50	
V_{DSS}	T_J = 25°C to 150°C		500		500	V
V_{DGR} ①	T_J = 25°C to 150°C		500		500	V
V_{GS}	Continuous		±20		±20	V
V_{GSM}	Transient		±30		±30	V
I_{D25}	T_C = 25°C	55	50	55	50	A
I_{DM} ②	T_C =25°C,	220	200	220	200	A
I_{AR}	T_C = 25°C	55	50	50	50	A
E_{AR}	T_C = 25°C		60		60	mJ
dv/dt	$I_S \le I_{DM}$, di/dt ≤ 100 A/µs, $V_{DD} \le V_{DSS}$ $T_J \le 150°C$, R_G = 2 Ω		5		5	V/ns
P_D	T_C = 25°C		560		600	W
T_J			-55 ... +150			°C
T_{JM}				150		°C
T_{stg}			-55 ... +150			°C
T_L	1.6 mm (0.063 in) from case for 10 s		300	N/A		°C
V_{ISOL}	50/60 Hz, RMS t = 1 min		N/A	2500		V~
	$I_{ISOL} \le$ 1 mA t = 1 s		N/A	3000		V~
M_d	Mounting torque		0.9/6	1.5/13		Nm/lb.in.
	Terminal connection torque		N/A	1.5/13		Nm/lb.in.
Weight			10		30	g

Symbol	Test Conditions (T_J = 25°C, unless otherwise specified)		Characteristic Values Min.	Typ.	Max.	
V_{DSS}	V_{GS} = 0 V, I_D = 5mA		500			V
	V_{DSS} temperature coefficient			0.096		%/K
$V_{GS(th)}$	$V_{DS} = V_{GS}$, I_D = 8mA		2		4	V
	$V_{GS(th)}$ temperature coefficient			-0.201		%/K
I_{GSS}	V_{GS} = ±20V; V_{DS} = 0V				±200	nA
I_{DSS}	$V_{DS} = 0.8 \cdot V_{DSS}$ V	T_J = 25°C			400	µA
	V_{GS} = 0 V	T_J = 125°C			2	mA
$R_{DS(on)}$	V_{GS} = 10 V, $I_D = 0.5 \cdot I_{D25}$ Pulse test, t ≤ 300 ms, duty cycle d ≤ 2 %	55N50			85	mΩ
		50N50			100	mΩ

Features
- International standard packages
- Encapsulating epoxy meets UL 94 V-0, flammability classification
- miniBLOC with Aluminium nitride isolation
- Low $R_{DS\ (on)}$ HDMOS™ process
- Rugged polysilicon gate cell structure
- Unclamped Inductive Switching (UIS) rated
- Low package inductance
- Fast intrinsic Rectifier

Applications
- DC-DC converters
- Battery chargers
- Switched-mode and resonant-mode power supplies
- DC choppers
- Temperature and lighting controls

Advantages
- Easy to mount
- Space savings
- High power density

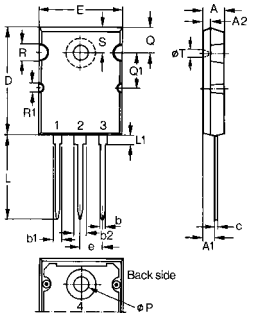
Symbol	Test Conditions (T_J = 25°C, unless otherwise specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	V_{DS} = 10 V; I_D = 0.5 • I_{D25}, pulse test		45		S
C_{iss}			9447		pF
C_{oss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz		1260		pF
C_{rss}			611		pF
$t_{d(on)}$			39		ns
t_r	V_{GS} = 10 V, V_{DS} = 0.5 • V_{DSS}, I_D = 0.5 • I_{D25}		70		ns
$t_{d(off)}$	R_G = 1 Ω (External),		153		ns
t_f			73		ns
$Q_{g(on)}$			445		nC
Q_{gs}	V_{GS} = 10 V, V_{DS} = 0.5 • V_{DSS}, I_D = 0.5 • I_{D25}		54		nC
Q_{gd}			235		nC
R_{thJC}	TO-264 AA			0.22	K/W
R_{thCK}	TO-264 AA		0.15		K/W
R_{thJC}	miniBLOC, SOT-227 B			0.21	K/W
R_{thCK}	miniBLOC, SOT-227 B		0.05		K/W

Source-Drain Diode

Symbol	Test Conditions (T_J = 25°C, unless otherwise specified)		Characteristic Values Min.	Typ.	Max.	
I_S	V_{GS} = 0	55N50			55	A
		50N50			50	A
I_{SM}	Repetitive;	55N50			220	A
	pulse width limited by T_{JM}	50N50			200	A
V_{SD}	I_F = 100 A, V_{GS} = 0 V, Pulse test, t ≤ 300 µs, duty cycle d ≤ 2 %				1.5	V
t_{rr}				209		ns
Q_{RM}	I_F = 50 A, -di/dt = 100 A/µs, V_R = 100 V			1.4		µC
I_{RM}				13		A

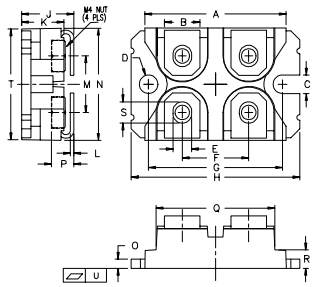
Notes:
1. R_{GS} = 1 MΩ
2. Pulse width limited by T_{JM}.

TO-264 AA Outline



Dim.	Millimeter Min.	Max.	Inches Min.	Max.
A	4.82	5.13	.190	.202
A1	2.54	2.89	.100	.114
A2	2.00	2.10	.079	.083
b	1.12	1.42	.044	.056
b1	2.39	2.69	.094	.106
b2	2.90	3.09	.114	.122
c	0.53	0.83	.021	.033
D	25.91	26.16	1.020	1.030
E	19.81	19.96	.780	.786
e	5.46 BSC		.215 BSC	
J	0.00	0.25	.000	.010
K	0.00	0.25	.000	.010
L	20.32	20.83	.800	.820
L1	2.29	2.59	.090	.102
P	3.17	3.66	.125	.144
Q	6.07	6.27	.239	.247
Q1	8.38	8.69	.330	.342
R	3.81	4.32	.150	.170
R1	1.78	2.29	.070	.090
S	6.04	6.30	.238	.248
T	1.57	1.83	.062	.072

miniBLOC, SOT-227 B



M4 screws (4x) supplied

Dim.	Millimeter Min.	Max.	Inches Min.	Max.
A	31.50	31.88	1.240	1.255
B	7.80	8.20	0.307	0.323
C	4.09	4.29	0.161	0.169
D	4.09	4.29	0.161	0.169
E	4.09	4.29	0.161	0.169
F	14.91	15.11	0.587	0.595
G	30.12	30.30	1.186	1.193
H	38.00	38.23	1.496	1.505
J	11.68	12.22	0.460	0.481
K	8.92	9.60	0.351	0.378
L	0.76	0.84	0.030	0.033
M	12.60	12.85	0.496	0.506
N	25.15	25.42	0.990	1.001
O	1.98	2.13	0.078	0.084
P	4.95	5.97	0.195	0.235
Q	26.54	26.90	1.045	1.059
R	3.94	4.42	0.155	0.174
S	4.72	4.85	0.186	0.191
T	24.59	25.07	0.968	0.987
U	-0.05	0.1	-0.002	0.004

Figure 1. Output Characteristics at 25°C

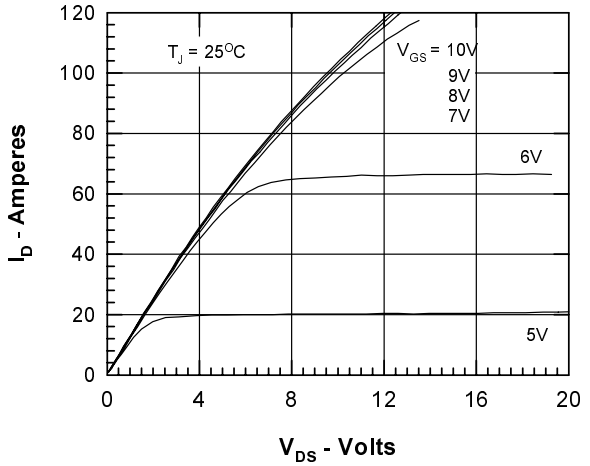


Figure 2. Output Characteristics at 125°C

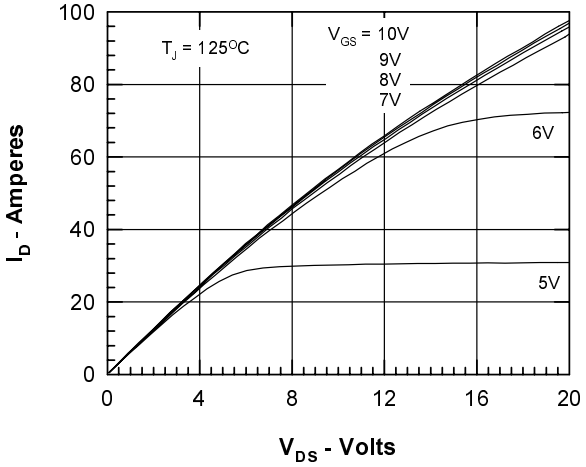


Figure 3. $R_{DS(on)}$ normalized to 0.5 I_{D25} value vs. I_D

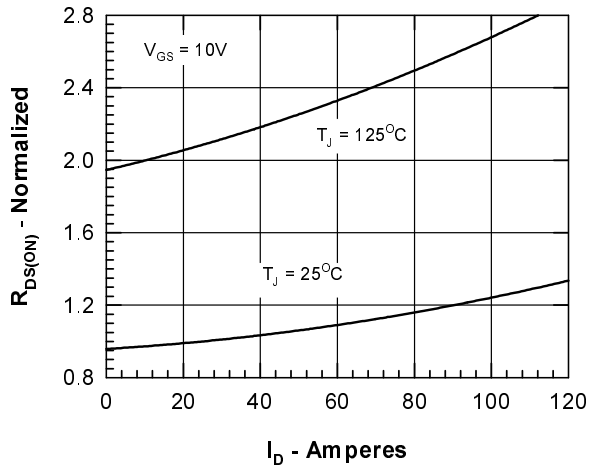


Figure 4. $R_{DS(on)}$ normalized to 0.5 I_{D25} value vs. T_J

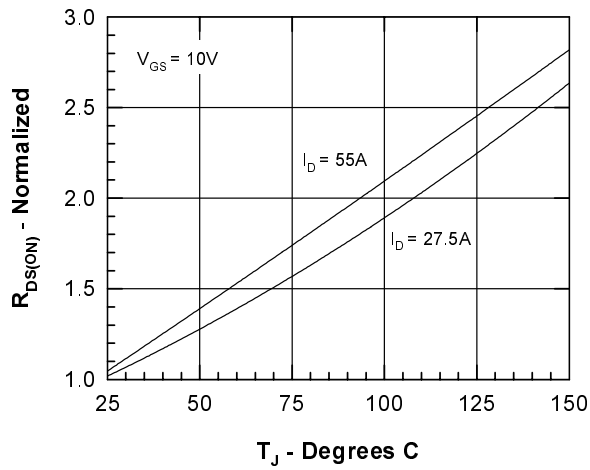


Figure 5. Drain Current vs. Case Temperature

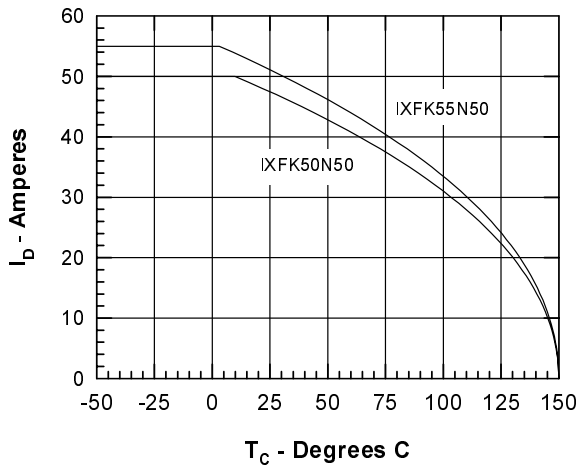


Figure 6. Admittance Curves

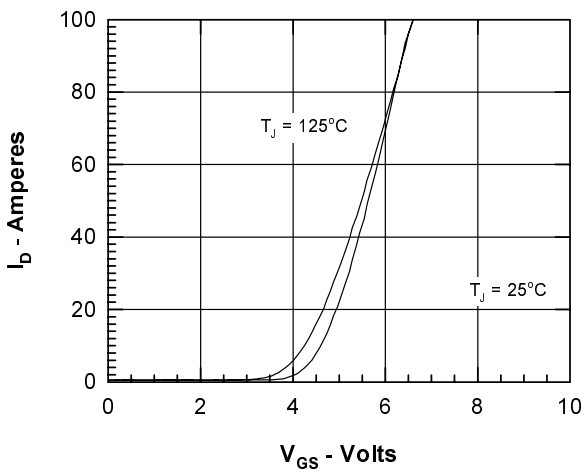


Figure 7. Gate Charge

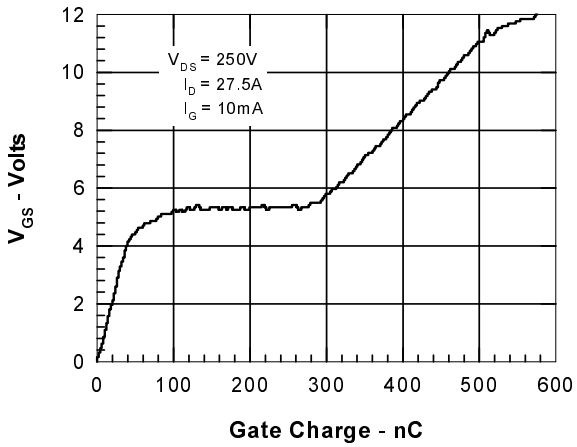


Figure 8. Capacitance Curves

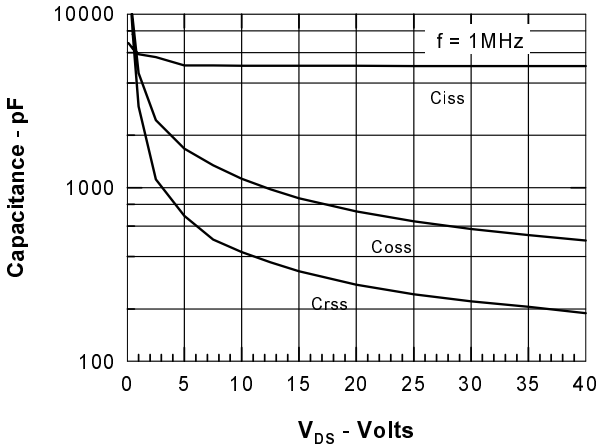


Figure 9. Forward Voltage Drop of the Intrinsic Diode

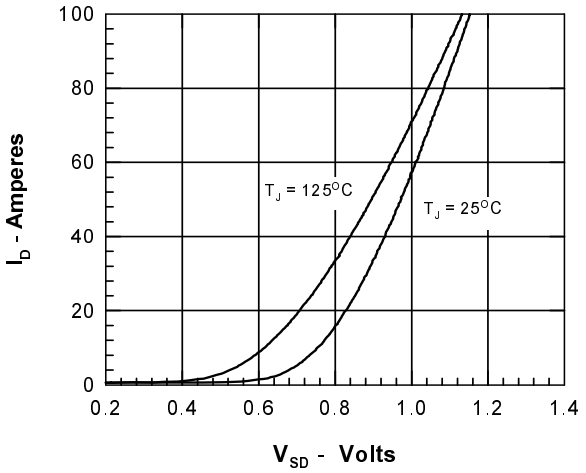


Figure10. Forward Bias Safe Operating Area

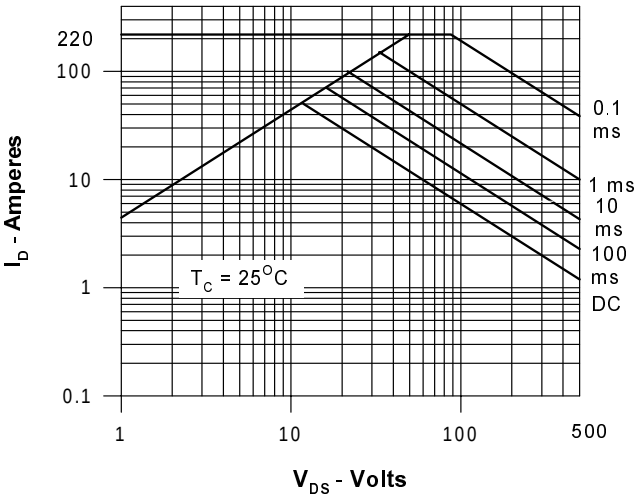


Figure 11. Transient Thermal Resistance